

REMARKS

This is a full and timely response to the Office Action mailed March 4, 2008. Reconsideration and allowance of the application and the presently pending claims, as amended, are respectfully requested.

Present Status of the Application

Claims 1-21 and 23-26 are pending in the present application. The Office Action presents the following points:

- 1) The disclosure is objected to because of the informality in connection with the spelling of the word "dyke;"
- 2) Claim 14 is rejected under 35 USC 101 because the claimed recitation of use, without setting forth any steps involved in the process, results in an improper definition of a process;
- 3) Claims 1-21 and 23-26 stand rejected under 25 USC 112, second paragraph, as being indefinite;
- 4) Claims 1-2, 5-8, 15 and 23-24 and claims 1-8, 15 and 23-24 stand rejected in view of Reinke (US 3,759,799) as being anticipated or rendered obvious by Reinke, respectively;
- 5) Claims 1-2 and claims 1-5 and 7 stand rejected in view of Suzuki (JP 58-175237) as anticipated or rendered obvious, respectively;
- 6) Claims 1-2 and 5 stand rejected as anticipated by Bennett (US 2,439,283);
- 7) Claims 1-2 and 5 stand rejected as anticipated by Marwick (US 661,615);
- 8) Claims 1-2 stand rejected as anticipated by Sugawara (US 5,312,694);
- 9) And lastly claims 1-5 and 7 stand rejected as anticipated in view of Hustler (US 4,226,686).

Claims 1, 4, 5, 8, 16, 18, 21, 25 and 26 are amended herein. The claims are amended to address the rejection presented under 35 USC 112, second paragraph, for indefiniteness. In particular, addition, claim 1 is amended to incorporate the features of claims 2, 3 and 7. In view of the amendment of claims 1, claims 2, 3 and 7 are canceled. Additionally, claim 14 is canceled. Claims 22 and 27-29 were previously canceled.

The cited prior art made of record has been considered, but is not believed to affect the patentability of the presently pending claims as presented herein. Applicant believes that no new matter has been added, and that a new search is not necessary.

I. Claim Rejection – 35 USC §101

Claim 14 is canceled herein, thereby traversing this rejection.

II. Claim Rejections – 35 USC §112, second paragraph

Claims are amended to change the term "dyke" to "dike" throughout the claims, addressing the concerns in paragraphs 5 and 10 of the Office Action. Also, the terms "intersections" and "heights" are incorporated into the claims to replace the terms "crossing points" and "thickness" respectively, addressing the concerns of paragraphs 10 and 11 of the Office Action. Moreover, the subject matter of claims 2, 3 and 7 has been included in amended claim 1 to more clearly define the current invention, further addressing the indefiniteness concerns expressed in the Office Action. Applicant respectfully submits that, in view of these amendments, this rejection is traversed.

III. Claim Rejections – 35 USC §102/103

a) Reinke (US Patent 3,759,799)

In paragraphs 15 to 17 of the Office Action a rejection on the basis of Reinke (US3759799) is presented. Applicants respectfully submit that Reinke, which is discussed in the current specification, does not anticipate or render obvious the screen material or method of making same recited in the pending claims.

The rejection of claims 1-8, 15, and 23-24 is based on an interpretation of Reinke which the Applicants do not share. Claim 1 recites that the metal screen material has a flat side and a difference in height on the side opposite to the flat side. The screen materials of Reinke do not have a flat side. This is best illustrated in Figures 3, 12 and 14 of Reinke. Figure 3 is an enlarged sectional view taken through the plate and mesh following the deposition of a metal coating thereon from an electrolytic process illustrating the mesh and plate in assembled relation; Figure 12 is a fragmentary diagrammatic view of a mandrel plate, platings and mesh illustrating another form and method for making the printing screen according to that invention; and Figure 14 is an enlarged sectional view. Again, it is emphasized that a screen material based on a woven structure does not have any flat sides, since the threads of the woven structure cross one another on each side alternatively, resulting in projections in vertical direction on either side. There is no teaching either explicitly or implied in Reinke that would suggest or teach a person skilled in the art Applicant's claimed screen.

Moreover, Reinke employs an electrolytic process that first fully and completely surrounds or envelops the woven wire mesh (paragraph bridging columns 3 and 4). Only then a printing pattern or image is produced on the smooth side of the mesh by conventional photomechanical processes including etching, whereby the mesh is opened in the pattern (column 4, lines 4-7). Figure 6, to which the Examiner is referring, is actually the mesh wire without any electroformed coating left.

Therefore the printing screen made by Reinke is very different from that of the metal screen material that is currently claimed. It would not be obvious to one of ordinary skill in the art at the time the invention was made to modify the process of fully enveloping a mesh wire and etching away the coating to provide a pattern, as illustrated by Reinke, to arrive at a metal screen material having a flat side without side without projecting parts, comprising a network of dikes which are connected to one another by intersections, which dikes delimit openings, the height of the intersections not being equal to the height of the dikes on the side of the screen material opposite to the flat side, wherein the height of the intersections is greater than the height of the dikes, wherein the difference between the height of the intersections and the height of the dikes is in the range from 20-250 micrometers, and wherein the screen material is electroformed.

Accordingly, Reinke neither anticipates, nor renders obvious, claims 1-8, 15 and 23-24.
b) Suzuki (JP 58-175237)

In paragraphs 18-21 of the Office Action rejections of claims 1-5 and 7 on the basis of Suzuki et al (JP58-175237) are presented. Attached please find a translation of Suzuki et al.

Suzuki provides a shadow mask type color picture tube, comprising a shadow mask which is located adjacent to a fluorescent screen and which has large number of stripe-like holes, the shadow mask is characterized that the stripe-like holes are arranged in a columnar pattern, are separated from another in a stripe direction by bridge parts, and are also separated in a direction orthogonal to the stripe direction by bank parts, and that groove parts are formed on or across the bank parts of the screen side. (See claim 1.)

As indicated on page 3, lines 5-12, the shadow mask is made of a steel plate, having a thickness of about 0.15 mm. The method for producing the shadow mask has not been disclosed. Moreover, the shadow mask of Suzuki has groove parts, formed on or across bank parts on the screen side of the shadow mask. The bank parts (12), however, have the same thickness as that of the shadow mask (11), see page 4, lines 15-16. In other words, Suzuki et al does not provide a screen material wherein the height of the intersections is greater than the height of the dikes.

Since no method for preparing the shadow mask has been provided in Suzuki, it is not obvious to one of ordinary skill in the art at the time the invention was made to amend the shadow mask and to prepare a metal screen material as claimed by Applicant. Suzuki, therefore, neither anticipates, nor renders obvious, claims 1-2 and 5.

c) Bennett (US Patent 2,439,283)

In paragraphs 22 and 23 of the Office action, a rejection of claims 1, 2 and 5 is presented as anticipated by Bennett (US2439283). Bennett concerns a broiler grill. Applicants agree with the Examiner that the broiler grill has flat side. As a matter of fact, the grill has two flat sides. As a result of the heavily calendaring it no longer has intersections that have a greater height than the height of the dikes. See in particular column 1, lines 49-59, which shows that the woven wire mesh screen of Bennett is flattened on both sides. Bennett, therefore, does not anticipate claims 1, 2 or 5.

d) Marwick (US Patent 661,615)

In paragraphs 24 and 25 of the Office Action a rejection of claims 1-2 and 5 is presented on the basis of anticipation by Marwick (US661615). Marwick, however, concerns a top plate for registers and the like, said plate being formed of sheet material and perforated to form bars therein (claim 1). The plate is preferably made of sheet metal and the holes B B' are preferable made by means of a punch. Rather than intersections that are greater in height, Marwick has downwardly-extending ribs at the sides of the holes. These ribs are provided so as to withstand the weight of a person standing on the center of the register (column 1, lines 31-49). In other words, the top plate of Marwick is entirely different from the metal screen material currently claimed, made by a different method, and made for a different purpose. Applicants, therefore, submit that Marwick does not anticipate claims 1-2 and 5.

e) Sugawara (US Patent 5,312,694)

In paragraphs 26 and 27 of the Office Action a rejection of claims 1-2 is presented as anticipated by Sugawara (US5312694). Sugawara describes a material for catalyzer for purification of exhaust gas and a catalyzer using such a material. The material for the catalyzer is formed by providing a plurality of tabs protruding from one side surface or either side surfaces of a heat-resistant metallic thin plate (see Abstract). The tabs each have a protruding height H of about 0.5 mm (column 2, line 29). This is significantly greater than the difference in height between the intersections and the dikes of the currently claimed metal screen material. Referring to Figure 7, and to column 3 lines 28-32 concerning the winding of the metallic thin plate in a spiral form (which is different from a cylinder). Applicants do not understand at all the relevance of this cross-sectional view of a portion of the catalyzer for purifying exhaust gas, and

the comment made that it may be made cylindrical for use on a rotary press. Rather, one might expect that the tabs provided in this catalyzer would wreck havoc if used in a rotary press. Therefore, Sugawara does not anticipate claims 1 or 2.

f) Hustler (US Patent 4,226,686)

Finally, in paragraphs 28 and 29 of the Office Action a rejection of claims 1-5 and 7 is presented based on obviousness in view of Hustler (US4226686). Hustler discloses a sheet metal plate that has grooves formed in a side, by the electro chemical/photo resist method. Holes are formed in the same way, in the groove bottoms and pass through the metal thickness. (See abstract). The method for forming the porous sheet of Hustler is entirely different. The perforated sheet of Hustler is used in the construction of a combustion chamber for a gas turbine engine and hence is entirely different for that of the sheet material of the current invention as well. Also, Hustler's sheet does not have intersections with a height greater than that of the dikes. As a matter of fact, Hustler does not have dikes at all. Indeed, it is not clear, even with hindsight, how a person of ordinary skill in the art could modify the porous sheet of Hustler into a metal screen material as currently claimed. Therefore, Hustler fails to render obvious claims 1-5 and 7.

CONCLUSION

In light of the foregoing remarks set forth above, Applicants respectfully submit that the present application is in condition for allowance and as such, favorable allowance of the present application is hereby courteously requested. If, in the opinion of the Examiner, a telephone conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

Applicants believe no fee is due. The Commissioner is hereby authorized to credit any overpayment and charge any additional fees due to Deposit Account 20-0778.

Respectfully Submitted,
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(19) Japan Patent Office (JP)

(12) Unexamined Patent Publication (A)

(11) Laid Open No. S58-175237

(43) Laid-Open Date: October 14, 1983

Number of Invention: 1

Substantive Examination: not requested

(54) COLOR PICTURE TUBE

(21) Japanese Patent Application No. S57-55986

(22) Application Date: April 6, 1982

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Specification

1. Title of the Invention

COLOR PICTURE TUBE

2. Claims

(1) A shadow mask type color picture tube comprising a shadow mask which is located adjacent to a fluorescent screen and which has a large number of stripe-like holes, the shadow mask is characterized that the stripe-like holes are arranged in a columnar pattern, are separated from one

another in a stripe direction by bridge parts, and are also separated in a direction orthogonal to the stripe direction by bank parts, and that groove parts are formed on or across the bank parts of the screen side.

(2) The color picture tube as set forth in claim 1, characterized in that the parts where the groove parts are formed are arranged over the entire area of the shadow mask, over only the effective area having the stripe-like holes or over a part of the effective area or over a part of the non effective area other the effective area, or in a specific section.

(3) The color picture tube as set forth in claim 1 or 2, characterized in that the groove parts have a depth or a width which is gradually varied towards in a circumferential or peripheral direction of the shadow mask.

3. Detailed Description of the Invention

Technical Field of the Invention

The present invention relates to a shadow mask type color picture tube, and in particular to a shadow mask having a large number of stripe-like holes.

Background of the Invention

In general, a shadow mask type color picture tube comprises electron gun means for energizing fluorescent screens which respectively emit red, blue and green light rays, and a shadow mask arranged adjacent to the fluorescent screens between the fluorescent screens and the electron gun means so as to cause electron beams to impinge upon fluorescent substances exclusively correspond to the electron beams. As the shadow mask, there is in general used the so-called matrix mask having a large number of stripe-like holes that are micro holes through which electron beams pass. There have been proposed various slit type shadow mask, wherein in a color

selection substrate in which stripe-like holes are in general divided into a plurality of hole parts by bridge parts which are arranged in suitable pitches in a stripe direction, the stripe-like holes are partitioned by the bridge parts into adjacent hole parts, and are also partitioned by banks in a direction orthogonal to the stripe direction. That is, as shown in Fig. 1, the shadow mask (1) which is in general made of a steel plate having a thickness of about 0.15 mm, is formed therein stripe-like holes (3) at pitches of 0.6 mm in a horizontal direction orthogonal to the stripe direction, having a width of 0.3 mm on the screen side, and if bank parts (2) are formed with a width of 0.3 mm, the stripe-like holes have a width of 0.14 mm on the electron gun side, and bridge parts have a width of 0.05 mm with pitches of about 1 mm in the stripe direction, on the electron gun side.

Problems in the Background Technology

However, there has been caused such a defect that should the above-mentioned shadow mask be formed in a required spherical shape, the bridge parts would be broken during forming thereof since the tensile strength of the bridge part is extremely small in comparison with the bank parts. Further, it is required to set the width of the bridge parts to a larger value in a range from 0.2 to 0.3 mm or to set the thickness to be large in order to prevent the bridge parts from being broken. However, in the case of the bridge part having a large width, there are caused a problem of shadowing upon exposure, occurrence of moiré or reduction in the passage rate of electron beams when the stripe-like fluorescent substances are formed. Alternately, in the case of the larger thickness, there is caused the disadvantage that the halation of the electron beams deteriorates. Anyway, the materialization is difficult.

Objects of the Invention

The present invention is devised in view of the above-mentioned conventional technology, and accordingly, an object of the present invention is to provide a shadow mask which is strong during a mask formation process and which has a less beam halation.

Summary of the Invention

According to the present invention, there is provided a shadow mask wherein groove parts are formed on or across bank parts on the screen side of the shadow mask, and a tensile load caused by a squeezing step in a mask forming process is dispersed on the bridge parts and the groove parts so as to enhance the formability and the mechanical strength of the shadow mask.

Embodiments of the Invention

Referring to Fig. 2 which is a perspective view illustrating a shadow mask used in a color picture tube according to the present invention, rows of stripe-like holes having several stripe-like hole parts (3) are formed being interposed between bank parts (12) having the same thickness as that of the shadow mask (11). The several stripe-like hole parts (3) are separated from one another by bridge parts (4) which are arranged at suitable pitches in a stripe direction. It is needless to say that the bridge parts (4) may be arranged being staggered on the respective stripe rows, or may be arranged in any other pattern. Groove parts (13) are spotted at random on the bank parts (12) of the screen side or are arranged in order, the groove parts (13) being formed on or across the bank parts so as to communicate the rows of the stripe-like holes which are partitioned by the bank parts, to one another. It is noted here that although the positions of the groove parts (13) on the bank part (12) are set to be the same positions as that of the bridge parts in a Y axial direction, that is, they preferably interpose therebetween the bank parts although they may not always be located at the same positions in view

of the use purpose.

Advantages of the Invention

The shadow mask configured as stated above, can have a high mask strength. Alternately, in the case that the pitches in an X axial direction are set to be large, even though the thickness and the width of the bank parts are larger, and as well even though the thickness and the width of the bank parts are changed, by suitably setting the shape and the positions of the groove parts, the tensile load caused by the squeezing step in the mask forming process, which has been conventionally concentrated to the bridge parts, is dispersed by the groove parts, on the bridge parts and the groove parts so as to decrease the tensile load difference in the X axial direction and the Y axial direction, in order to facilitate the process of forming the mask, and elongation of the stripe-like holes during the formation thereof can be decreased, thereby it is possible to eliminate breakage of the bridges even though the width of the bridge parts is small.

Further, as to the positions of the groove parts, the groove parts are formed across the bank parts at the Y axial positions of the bank parts with respect to the Y axial end parts or the corner parts of the bank parts having an electron beam shape, corresponding to the shape of the stripe-like holes in the several parts of the entire area of the screen, thereby it is possible to prevent the shapes of the electron beams from being deformed or to restrain halation.

4. Brief Description of the Drawings

Fig. 1 is a schematic perspective view illustrating a part of a shadow mask used in a conventional color picture tube, and Fig. 2 is a schematic perspective view illustrating a part of a shadow mask used in a color picture tube according to the present invention.

(3)... Stripe-Like Hole, (4)... Bridge Part,
(11)... Shadow Mask, (12)... Bank Part,
(13)... Groove Part.